

CLAIMS

What is claimed is:

1. A method of controlling the transmit power of a mobile terminal in a mobile communication system, comprising:
 - 5 varying a first transmit power level of the mobile station on a first reverse link channel responsive to power control commands from a serving base station; and varying a second transmit power level of the mobile station on a second reverse link channel responsive to power control commands from at least one non-serving base station.
 - 10 2. The method of claim 1 wherein the first reverse link channel is a reverse rate control channel and the second reverse link channel is a reverse traffic channel.
 - 15 3. The method of claim 2 wherein the gain of the reverse rate control channel is fixed relative to a reverse pilot channel and wherein the transmit power level of the mobile station on the reverse pilot channel is varied responsive to the power control commands from the serving base station.
 - 20 4. The method of claim 2 wherein the gain of the reverse traffic channel is fixed relative to a reverse pilot channel and wherein the transmit power level of the mobile station on the reverse pilot channel is varied responsive to the power control commands from the at least one non-serving base station.

5. The method of claim 1 wherein varying a second transmit power level of the mobile station on a second reverse link channel responsive to power control commands from at least one non-serving base station comprises:

5 receiving power control commands from one or more non-serving base stations; and
decreasing the second transmit power level if at least one of the non-serving base stations commands the mobile station to decrease its power level.

10 6. The method of claim 5 wherein varying a second transmit power level of the mobile station on a second reverse link channel responsive to power control commands from at least one non-serving base station further comprises increasing the second transmit power level if all of the non-serving base stations command the mobile station to increase its power level.

15 7. The method of claim 5 further comprising varying a second transmit power level of the mobile station on a second reverse link channel responsive to power control commands from the serving base station.

20 8. The method of claim 7 wherein varying a second transmit power level of the mobile station on a second reverse link channel responsive to power control commands from the serving base station comprises decreasing the transmit power level of the mobile station if the serving base station command the mobile station to decrease its transmit power.

9. The method of claim 8 wherein varying a second transmit power level of the mobile station on a second reverse link channel responsive to power control commands from the serving base station further comprises increasing the transmit power of the mobile station on the

second reverse link channel if the serving base station and each non-serving base station commands the mobile station to increase its transmit power.

10. The method of claim 1 further comprising computing a first channel gain of one of the
5 first and second reverse link channels relative to a third reverse link channel.

11. The method of claim 10 wherein varying a first transmit power level of the mobile station on a first reverse link channel responsive to power control commands from a serving base station comprises:

10 determining if the first channel gain meets a predetermined criterion; and
varying the transmit power level of the mobile station on the first reverse link channel if
the first channel gain meets the predetermined criterion.

12. The method of claim 11 further comprising varying the first transmit power level of the mobile station on the first reverse link channel responsive to power control commands from at least one non-serving base station if the first channel gain does not meet the predetermined criterion.

13. The method of claim 10 wherein varying a second transmit power level of the mobile station on a second reverse link channel responsive to power control commands from at least one non-serving base station comprises:

determining if the first channel gain meets a predetermined criterion; and
varying the transmit power level of the mobile station on the second reverse link channel if the first channel gain meets the predetermined criterion.

14. The method of claim 13 further comprising varying the second transmit power level of the mobile station on the second reverse link channel responsive to power control commands from the serving base station if the first channel gain does not meet the predetermined criterion.

5 15. The method of claim 10 further comprising computing a second channel gain of one of the first and second reverse link channels relative to the third reverse link channel.

10 16. The method of claim 10 wherein varying a first transmit power level of the mobile station on a first reverse link channel responsive to power control commands from a serving base station comprises:

15 determining if the second channel gain meets a first predetermined criterion;

 determining if the second channel gain meets a second predetermined criterion; and

 varying the transmit power level of the mobile station on the first reverse link channel if

 the first and second channel gains meet the first and second predetermined criterion respectively.

20 17. The method of claim 16 further comprising varying the first transmit power level of the mobile station on the first reverse link channel responsive to power control commands from at least one non- serving base station if the first channel gain does not meet the first predetermined criterion.

25 18. The method of claim 1 further comprising varying a first transmit power level of the mobile station on the first reverse link channel responsive to power control commands from at least one non-serving base station if the mobile station is in a discontinuous transmission mode.

19. The method of claim 2 wherein the reverse link comprises a primary pilot channel and at least one secondary pilot channel, and wherein the gain of the reverse traffic channel is fixed relative to the primary pilot channel.

5 20. The method of claim 19 wherein the gain of the reverse rate control channel is fixed relative to the sum of the transmit power on all reverse link pilot channels.

10 21. The method of claim 20 wherein the mobile station varies its transmit power on the primary pilot channel responsive to power control commands from at least one non-serving base station.

15 22. The method of claim 21 wherein the mobile station varies its transmit power on at least one secondary pilot channel responsive to power control commands from the serving base station such that the total transmit power on all reverse link pilot channels remains within predetermined limits.

20 23. The method of claim 1 wherein the first reverse link channel is a reverse pilot channel and the second reverse link channel is a reverse traffic channel.

24. The method of claim 1 wherein the first reverse link channel is a reverse rate control channel and the second reverse link channel is a reverse pilot channel.

25. A method of controlling the transmit power of a mobile terminal by a base station in a mobile communication system, comprising:

5 determining whether the base station is a serving base station for forward link

communications;

power controlling a first reverse link channel if the base station is the serving base

station;

power controlling a second reverse link channel if the base station is not the serving

base station.

10 26. The method of claim 25 wherein the first reverse link channel is a reverse rate control channel and the second reverse link channel is a reverse traffic channel.

15 27. The method of claim 26 wherein the gain of the reverse rate control channel is fixed relative to a reverse pilot channel.

20 28. The method of claim 27 further comprising power controlling the reverse pilot channel if the base station determines that it is the serving base station.

29. The method of claim 26 wherein the gain of the reverse traffic channel is fixed relative to a reverse pilot channel.

30. The method of claim 29 further comprising power controlling the reverse pilot channel if the base station determines that it is a non-serving base station.

31. The method of claim 25 further comprising power controlling the reverse pilot channel by a non-serving base station if the mobile station is in a discontinuous transmission mode and the received power on the reverse pilot channel is above a predetermined threshold at the non-serving base station.

32. A method of controlling the transmit power of a mobile terminal in a wireless communication system during a soft handoff wherein the active set for the mobile station includes two or more base stations, the method comprising:

5 selecting one of the base stations in the active set as the serving base station for forward link communications with the mobile terminal;

10 receiving power control commands from the serving base station and at least one non-serving base station in the active set;

15 varying a first transmit power level of the mobile station on a reverse rate control channel responsive to power control commands from a serving base station; and

20 varying a second transmit power level of the mobile station on a reverse traffic channel responsive to power control commands from at least one non-serving base station.

33. The method of claim 32 wherein the gain of the reverse rate control channel is fixed relative to a reverse pilot channel and wherein the transmit power level of the mobile station on the reverse pilot channel is varied responsive to the power control commands from the serving base station.

20 34. The method of claim 32 wherein the gain of the reverse traffic control channel is fixed relative to a reverse pilot channel and wherein the transmit power level of the mobile station on the reverse pilot channel is varied responsive to the power control commands from the non-serving base station.

35. The method of claim 32 wherein varying the transmit power level of the mobile station on the traffic channel responsive to power control commands from at least one non-serving base station comprises:

receiving power control commands from one or more non-serving base stations; and
5 decreasing the second transmit power level if at least one of the non-serving base stations commands the mobile station to decrease its power level.

36. The method of claim 35 wherein varying the transmit power level of the mobile station on the reverse traffic channel responsive to power control commands from at least one non-serving base station further comprises increasing the second transmit power level if all of the non-servicing base stations command the mobile station to increase its power level.

37. The method of claim 36 further comprising varying the transmit power level of the mobile station on the reverse traffic channel responsive to power control commands from the serving base station.

38. The method of claim 37 wherein varying the transmit power level of the mobile station on a reverse traffic channel responsive to power control commands from the serving base station comprises decreasing the transmit power level of the mobile station on the reverse traffic
20 channel if the serving base station commands the mobile station to decrease its transmit power.

39. The method of claim 38 wherein varying the transmit power level of the mobile station on a reverse traffic channel responsive to power control commands from the serving base station further comprises increasing the transmit power of the mobile station on the reverse traffic

channel if the serving base station and each non-serving base station in the active set commands the mobile station to increase its transmit power.

40. The method of claim 33 further comprising computing a first channel gain of the reverse
5 traffic channel relative to the reverse pilot channel.

41. The method of claim 40 wherein varying a first transmit power level of the mobile station on a reverse rate control channel responsive to power control commands from a serving base station comprises:

10 comparing the first channel gain to a predetermined minimum gain; and
varying the transmit power level of the mobile station on the reverse rate control channel
15 if the first channel gain is not less than the predetermined minimum gain.

42. The method of claim 41 further comprising varying the transmit power level of the mobile station on the reverse rate control channel responsive to power control commands from at least one non-serving base station if the first channel gain is less than the predetermined minimum gain.

43. The method of claim 41 further comprising computing a second channel gain of the reverse rate control channel relative to the reverse pilot channel.

44. The method of claim 43 wherein varying a first transmit power level of the mobile station on a reverse rate control channel responsive to power control commands from a serving base station further comprises:

25 comparing the second channel gain to a normal gain;

varying the transmit power level of the mobile station on the reverse pilot channel and
the reverse rate control channel if the second channel gain is equal to the normal
gain; and
varying the transmit power level of the mobile station on the reverse rate control channel
5 if the second channel gain is greater than the normal gain.

45. The method of claim 40 wherein varying a second transmit power level of the mobile
station on a reverse traffic channel responsive to power control commands from at least one
non-serving base station comprises:

10 comparing the channel gain to a predetermined maximum gain; and
varying the transmit power level of the mobile station on the reverse traffic channel if the
channel gain is more than the predetermined maximum gain.

15 46. The method of claim 45 further comprising varying the transmit power level of the mobile
station on the reverse traffic channel responsive to power control commands from the serving
base station if the channel gain is greater than the predetermined maximum gain.

20 47. The method of claim 34 further comprising computing a gain ratio of the reverse rate
control channel to the reverse pilot channel.

48. The method of claim 47 wherein varying a first transmit power level of the mobile station on a reverse rate control channel responsive to power control commands from a serving base station comprises:

comparing the channel gain to a predetermined maximum gain; and
5 varying the transmit power level of the mobile station on the reverse rate control channel if the channel gain is not greater than the predetermined maximum gain.

49. The method of claim 48 further comprising varying the transmit power level of the mobile station on the reverse rate control channel responsive to power control commands from at least one non-serving base station if the channel gain is greater than the predetermined maximum gain.

50. The method of claim 49 wherein varying a second transmit power level of the mobile station on a reverse traffic channel responsive to power control commands from at least one non-serving base station comprises:

comparing the channel gain to a predetermined minimum gain; and
varying the transmit power level of the mobile station on the reverse traffic channel if the channel gain is not less than the predetermined minimum gain.

20 51. The method of claim 50 further comprising varying the transmit power level of the mobile station on the reverse traffic channel responsive to power control commands from the serving base station if the channel gain is less than the predetermined minimum gain.

52. The method of claim 32 further comprising varying a transmit power level of
25 the mobile station on the first reverse pilot channel responsive to power control commands from

at least one non-serving base station if the mobile station is in a discontinuous transmission mode.

53. The method of claim 32 wherein the reverse link comprises a primary pilot channel and
5 at least one secondary pilot channel, and wherein the gain of the reverse traffic channel is fixed relative to the primary pilot channel.

54. The method of claim 53 wherein the gain of the reverse rate control channel is fixed relative to the sum of the transmit power on all reverse link pilot channels.

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55. The method of claim 54 wherein the mobile station varies its transmit power on the primary pilot channel responsive to power control commands from at least one non-serving base station.

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56. The method of claim 55 wherein the mobile station varies its transmit power on at least one secondary pilot channel responsive to power control commands from the serving base station such that the total transmit power on all reverse link pilot channels remains within predetermined limits.

57. A mobile station comprising:
a receiver to receive power control commands from a serving base station and at least
one non-serving base station, the serving and non-serving base stations forming
an active set for the mobile station;
5 power control logic to:
vary a first transmit power level of the mobile station on a first reverse link
channel responsive to power control commands from the serving base
station;
vary a second transmit power level of the mobile station on a second reverse
link channel responsive to power control commands from at least one
non- serving base station; and
a transmitter to transmit signals on the first and second reverse link channels at the first
and second transmit power levels respectively.

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58. The mobile station of claim 57 wherein the first reverse link channel is a reverse rate
control channel and the second reverse link channel is a reverse traffic channel.

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59. The mobile station of claim 58 wherein the gain of the reverse rate control channel is
fixed relative to a reverse pilot channel and wherein the power control logic varies the transmit
power level of the mobile station on the reverse pilot channel responsive to the power control
commands from the serving base station.

60. The mobile station of claim 58 wherein the gain of the reverse traffic channel is fixed
relative to a reverse pilot channel and wherein the power control logic varies the transmit power

level of the mobile station on the reverse pilot channel responsive to the power control commands from the at least one non-serving base station.

61. The mobile station of claim 57 wherein the power control logic decreases the second
5 transmit power level if at least one of the non-serving base stations in the active set commands the mobile station to decrease its power level.

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62. The mobile station of claim 61 wherein the power control logic increases the second transmit power level if all of the non-serving base stations in the active set command the mobile station to increase its power level.

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63. The mobile station of claim 57 wherein the power control logic varies the transmit power of the mobile station on the second reverse link channel responsive to power control commands from all the base stations in the active set for the mobile station, including the serving base station.

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64. The mobile station of claim 57 wherein the power control logic decreases the second transmit power level if the serving base station or any one of the non-serving base stations commands the mobile station to decrease its transmit power on the reverse traffic channel.

65. The mobile station of claim 57 wherein the power control logic increase the second transmit power level if all the base stations in its active set command the mobile station to increase its transmit power on the reverse traffic channel.

66. The mobile station of claim 57 further comprising computing a first channel gain of one of the first and second reverse link channels relative to a third reverse link channel.

67. The mobile station of claim 66 wherein the power control logic is operative to:
5 determine if the first channel gain meets a predetermined criterion; and
vary the transmit power level of the mobile station on the first reverse link channel if the first channel gain meets the predetermined criterion.

68. The mobile station of claim 67 further wherein the power control logic varies the first transmit power level of the mobile station on the first reverse link channel responsive to power control commands from at least one non-serving base station if the first channel gain does not meet the predetermined criterion.

69. The method of claim 67 further comprising computing a second channel gain of one of the first and second reverse link channels relative to the third reverse link channel.

70. The method of claim 69 wherein varying a first transmit power level of the mobile station on a first reverse link channel responsive to power control commands from a serving base station comprises:

20 determining if the second channel gain meets a first predetermined criterion;
determining if the second channel gain meets a second predetermined criterion; and
varying the transmit power level of the mobile station on the first reverse link channel if the first and second channel gains meet the first and second predetermined criterion respectively.

71. The mobile station of claim 66 wherein the power control logic is operative to:
determine if the first channel gain meets a predetermined criterion; and
vary the transmit power level of the mobile station on the second reverse link channel if
the first channel gain meets the predetermined criterion.

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72. The mobile station of claim 71 further wherein the power control logic varies the second
transmit power level of the mobile station on the second reverse link channel responsive to
power control commands from the serving base station if the first channel gain does not meet
the predetermined criterion.

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73. The mobile station of claim 57 wherein the power control logic varies the transmit power
of the mobile station on the first reverse link channel responsive to power control commands
from non-serving base stations when the mobile station is in a discontinuous transmission
mode.

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74. The mobile station of claim 58 wherein the reverse link comprises a primary pilot
channel and at least one secondary pilot channel, and wherein the gain of the reverse traffic
channel is fixed relative to the primary pilot channel.

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75. The mobile station of claim 74 wherein the gain of the reverse rate control channel is
fixed relative to the sum of the transmit power on all reverse link pilot channels.

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76. The mobile station of claim 75 wherein the power control logic varies the transmit power
of the mobile station of the primary pilot channel responsive to power control commands from at
least one non-serving base station.

77. The mobile station of claim 76 wherein the power control logic varies the transmit power of at least one secondary pilot channel responsive to power control commands from the serving base station such that the total transmit power on all reverse link pilot channels remains within
5 predetermined limits.

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78. A base station for a wireless communication network, comprising:
a receiver to receive signals from a mobile station on first and second reverse link
channels at first and second received power levels respectively;
power control logic to:
5 determine whether the base station is a serving base station for forward link
communications;
generate power control commands to power control a first reverse link channel
if the base station is the serving base station;
generate power control commands to power control a second reverse link
channel if the base station is a non-serving base station; and
a transmitter to transmit the power control commands to the mobile station;

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79. The base station of claim 78 wherein the first reverse link channel is a reverse rate
control channel and the second reverse link channel is a reverse traffic channel.

80. The base station of claim 79 wherein the gain of the reverse rate control channel is fixed
relative to a reverse pilot channel.

81. The base station of claim 80 wherein the power control logic generates power control
20 commands to power control the reverse pilot channel if the base station determines that it is the
serving base station.

82. The base station of claim 78 wherein the power control logic generates a first power
control command to power control the reverse pilot channel and a second power control

command to power control the reverse rate control channel if the base determines that it is the serving base station.

83. The base station of claim 79 wherein the gain of the reverse traffic channel is fixed
5 relative to a reverse pilot channel.

84. The base station of claim 83 further wherein the power control logic generates power control commands to power control the reverse pilot channel if the base station determines that it is a non-serving base station.

85. The base station of claim 78 further wherein the power control logic for a non-serving base station generates power control commands to power control the reverse pilot channel if the mobile station is in a discontinuous transmission mode and received power on the reverse pilot channel is above a predetermined threshold at the non-serving base station.